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Fact Sheet

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REMR MANAGEMENT SYSTEM FOR EARTH AND ROCKFILL EMBANKMENT DAMS

The Problem

The U.S. Army Corps of Engineers owns and operates over 500 large dams and spends some $200 million annually on their maintenance. Most of these dams have significant embankment sections. Funding for maintenance and repair (M&R) of these structures is becoming increasingly difficult to obtain. All levels of management are also asking for increasingly detailed justification before approving work. These resource limitations and justification demands require that M&R needs be prioritized with increasing care and the funds be spent efficiently. A quantitative rating system for the condition of embankment dams is needed.

The Technology

To assist managers with M&R planning and budgeting, the U.S. Army Construction Engineering Research Laboratory (CERL) has developed a Repair, Evaluation, Maintenance, and Rehabilitation (REMR) system for embankment dams. This management system is based on existing inspection data and contains an evaluation framework and condition rating procedures. This CI evaluation is intended to elicit the engineers' knowledge about the performance of the embankment dam and provide quantitative information to aid in prioritizing M&R for an embankment dam. It provides the engineers anopportunity to think about the dam as a system and helps them organize their knowledge. A computer application employing this condition rating system has been created to provide an automated decision-support tool to engineers and managers who plan REMR activities for embankment dams. The computer program includes data storage and handling capabilities, automated calculations, and reports for work planning and budgeting purposes.

The management system features a 100-point Condition Index (CI) that rates the structure on physical condition and the extent to which it is performing its intended function (see CERL Fact Sheet CF-22, The Condition Index). The index is primarily a planning tool with the index values serving as an indicator of the general condition level of the structure. The index is meant to focus engineering attention on those structures most likely to warrant immediate repair or further evaluation. In addition, the CI values can be used to monitor change in general condition over time and can serve as an approximate comparison of the conditions of different structures.

In addition to calculating the CI for the dam, the system also uses the collected information to produce priority rankings for the components. These numerical priority rankings are based on the condition and importance of the components and can be used to assist in prioritizing specific M&R tasks based on their effect on the performance of the dam.

Analysis of the dam begins with engineers knowledgeable about the dam prioritizing the subsystems and components by developing importance weightings in a guided process using "interaction matrices." Application of this management system is based on the knowledge and experience of the responsible engineers and on existing inspection information. The condition ratings and importance weightings are entered into the system to compute the CI and priority rankings. The results should reflect the engineers' understanding of the dam.

Benefits/Savings

This computerized REMR Management System provides procedures for performing condition surveys, consistent and quantitative condition assessment, and data base management. The embankment CI is primarily a tool to help prioritize and justify M&R expenditures. There are a number of directly and indirectly related associated benefits of the embankment dam CI:

1. It is a good measure of changes in condition or performance over time. On a system level, this can tell managers whether long-term funding is adequate to maintain their facilities.

2. It assists engineers in evaluating the relative importance of existing deficiencies and prioritizing needs. It is not a detailed evaluation of dam safety nor does it replace criteria-based standards.

3. It can aid engineers when communicating with management regarding the importance and severity of deficiencies.

4. It assists when with prioritization of requirements for instrumentation and monitoring of dams.

5. It is a useful tool for assisting journeyman engineers in understanding how more experienced engineers make their evaluations.

The ultimate goal is to achieve the best possible condition for embankment dam structures at any given funding level. Combined with economic analyses, these procedures assist in efficient M&R budget planning through the evaluation of current condition and comparison of various M&R alternatives.

Status

The REMR Management System for embankment dams is scheduled for completion and fielding in FY98. It has been partially field-tested and is currently undergoing final review and documentation before implementation throughout the U.S. Army Corps of Engineers. Software for embankment dams is available on the internet at http://owww.cecer.army.mil/fl/remr/remr.html.

Point of Contact

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